

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1 Claim 1. (currently amended) A broadcast system, comprising:
2 one or more information additive code transmitters configured to broadcast
3 information additive codes to one or more information additive code receivers, each information
4 additive code transmitter comprising an encoder configured to receive source data and to
5 produce information additive codes therefrom; and
6 one or more information additive code receivers configured to receive the
7 information additive code broadcast by at least one of the one or more information additive code
8 transmitters, each information additive code receiver comprising a decoder configured to
9 substantially reconstruct a copy of the source data from the received information additive codes;
10 wherein the information additive code transmitted to the one or more information additive code
11 receivers at any particular time is independent of the information additive code previously
12 received by each of the one or more information additive code receivers, wherein when an
13 amount of non-redundant information additive code sufficient to reconstruct the source data has
14 been received, the information additive code receivers reconstruct the source data independent of
15 when, and from which information additive code transmitters, the information additive code was
16 received.

1 Claim 2. (previously presented) The broadcast system of claim 1, wherein the
2 encoder comprises a single-stage encoder, and wherein the decoder comprises a single-stage
3 decoder.

1 Claim 3. (previously presented) The broadcast system of claim 1, wherein the
2 encoder comprises a multistage encoder, and wherein the decoder comprises a multistage
3 decoder.

1 Claim 4. (original) The broadcast system of claim 1, wherein the information
2 additive code transmitter further comprises a protocol converter coupled to the encoder, and
3 wherein the information additive code receiver comprises a protocol converter coupled to the
4 decoder.

1 Claim 5. (original) The broadcast system of claim 1, wherein at least one of the
2 one or more information additive code receivers further comprises means for receiving data via a
3 secondary channel.

1 Claim 6. (original) The broadcast system of claim 1, wherein the coded
2 transmission is communicated via a satellite link.

1 Claim 7. (original) The broadcast system of claim 1, wherein the coded
2 transmission is communicated via a terrestrial wireless link.

1 Claim 8. (original) The broadcast system of claim 1, wherein the coded
2 transmission is communicated via an electrical or optical cable.

1 Claim 9. (currently amended) The broadcast system of claim 1, wherein the
2 encoder further comprises:
3 a cache unit having an input coupled to receive segments of source data and an
4 output coupled to the encoder, the cache unit configured to store ~~source~~ segments of source data
5 and to output segments of source data to the encoder upon receipt of a command; and
6 a control unit coupled to the cache unit and to the encoder, the control unit
7 configured to output the command signal to the cache unit.

1 Claim 10. (previously presented) The broadcast system of claim 9, wherein the
2 cache unit further comprises:
3 an upload unit having an input coupled to receive segments of source data, a
4 command port coupled to the control unit, and an output; and

5 two or more segment buffers having an input coupled to the upload unit and an
6 output coupled to the encoder.

1 Claim 11. (original) The broadcast system of claim 10, wherein the encoder
2 comprises two or more encoders each having an input coupled to the output of the two or more
3 segment buffers.

1 Claim 12. (currently amended) The broadcast system of claim 1, wherein the
2 information additive code transmitter further comprises a transmit module coupled to the
3 encoder, the transmit module operable to modulate the information additive code onto a carrier
4 signal, the carrier signal modulated with ~~embedding~~ the information additive code comprising a
5 coded transmission.

1 Claim 13. (original) The broadcast system of claim 12, wherein the information
2 additive code receiver further comprises a receive module coupled to the decoder, the receive
3 module operable to demodulate the coded transmission, thereby extracting the information
4 additive code, the receive module supplying the extracted information additive code to the
5 decoder.

1 Claim 14. (currently amended) An information additive code transmitter,
2 comprising:
3 an encoder configured to receive source data and to produce information additive
4 code therefrom; and
5 a transmit module coupled to the encoder and configured to broadcast the
6 information additive code to a plurality of information additive code receivers; wherein the
7 information additive ~~codes~~ code transmitted to the plurality of information additive code
8 receivers at any particular time is independent of the information additive ~~codes~~ code previously
9 received by each of the plurality of information additive code receivers, wherein when an
10 amount of non-redundant information additive code sufficient to reconstruct the source data has

11 been received, the information additive code receivers reconstruct the source data independent of
12 when, or in what order, the information additive code was received.

1 Claim 15. (previously presented) The information additive code transmitter of
2 claim 14, wherein the encoder comprises a single stage encoder, further comprising:
3 an input symbol generator configured to receive the source data and to provide an
4 ordered sequence of input symbols in response;
5 a key generator operable to output an encoding key for each input symbol in the
6 ordered sequence; and
7 a symbol encoder coupled to the input symbol generator and the key generator,
8 the symbol encoder operable to receive the ordered sequence of input symbols and the encoding
9 key for each input symbol, and in response produce output symbols comprising the information
10 additive code.

1 Claim 16. (previously presented) The information additive code transmitter of
2 claim 14, wherein the encoder comprises a multistage encoder, comprising:
3 an input symbol generator having an input for receiving the source data and an
4 output for providing an ordered sequence of input symbols in response;
5 a static key generator configured to provide a sequence of static encoding keys
6 corresponding to the sequence of input symbols;
7 a dynamic key generator configured to provide a sequence of dynamic encoding
8 keys corresponding to the sequence of input symbols; and
9 a symbol encoder coupled to the input symbol generator, the static key generator,
10 and the dynamic key generator, the symbol encoder comprising:
11 a static encoder configured to receive the ordered sequence of input
12 symbols and the corresponding sequence of static encoding keys, the static encoder
13 producing a sequence of redundant symbols in response; and
14 a dynamic encoder coupled to the static encoder and configured to receive
15 the sequence of redundant symbols and the sequence of dynamic encoding keys, the

16 dynamic encoder producing a sequence of output symbols in response, the output
17 symbols comprising the information additive code.

1 Claim 17. (currently amended) The information additive code transmitter of
2 claim 14, wherein the encoder comprises:

3 a cache unit having an input coupled to receive segments of source data and an
4 output coupled to the encoder, the cache unit configured to store ~~source~~segments of source data
5 and to output segments of source data to the encoder upon receipt of a command; and

6 a control unit coupled to the cache unit and to the encoder, the control unit
7 configured to output the command signal to the cache unit.

1 Claim 18. (previously presented) The information additive code transmitter of
2 claim 17, wherein the cache unit further comprises:

3 an upload unit having an input coupled to receive segments of source data, a
4 command port coupled to the control unit, and an output; and

5 two or more segment buffers having an input coupled to the upload unit and an
6 output coupled to the encoder.

1 Claim 19. (original) The information additive code transmitter of claim 18,
2 wherein the encoder comprises a respective two or more encoders each having an input coupled
3 to the output of the two or more segment buffers.

1 Claim 20. (currently amended) The information additive code transmitter of
2 claim 14, wherein the encoder comprises:

3 means for receiving a first segment of a live data stream, the first segment S_0
4 containing first segment data;

5 means for applying a forward error correction algorithm to the first segment data
6 to produce a corresponding transmit block T_0 ;

7 means for dividing the T_0 block into two or more T_0 subblocks, wherein each of
8 the two or more T_0 subblocks comprise substantially distinct FEC-encoded first segment data;

9 means for transmitting a first of the two or more T_0 subblocks to a receiver on a
10 first main subchannel;
11 means for receiving a second segment of the live data stream, the second segment
12 S_1 containing second segment data;
13 means for applying a forward error correction algorithm to the second segment
14 data to produce a transmit block T_1 ;
15 means for dividing the T_1 block into two or more T_1 subblocks, wherein each of
16 the two or more T_1 subblocks comprise substantially distinct FEC-encoded second segment data;
17 means for transmitting substantially concurrently, the second of the two or more
18 T_0 subblocks on the first main subchannel and a first of the two or more T_1 subblocks on a
19 second main subchannel; and
20 means for transmitting substantially concurrently, the first T_0 subblock on a first
21 booster subchannel, and the first T_1 subblock on a second booster subchannel, wherein the
22 second T_0 subblock, the first T_1 subblock, the first T_0 subblock, and the first T_1 subblock are all
23 transmitted substantially concurrently, wherein the T_0 , T_1 , and T_2 subblocks comprise the
24 information additive code.

1 Claim 21. (original) The information additive code transmitter of claim 14,
2 further comprising a protocol converter coupled to the encoder and configured to convert the
3 information additive code from a first protocol to a second protocol.

1 Claim 22. (original) The information additive code transmitter of claim 21,
2 wherein the first protocol is an IP protocol and the second protocol is a satellite broadcasting
3 system protocol.

1 Claim 23. (original) The information additive code transmitter of claim 21,
2 wherein the first protocol is an IP protocol and the second protocol is a terrestrial broadcasting
3 system protocol.

1 Claim 24. (currently amended) The information additive code transmitter of
2 claim 14, further comprising a transmit module coupled to the encoder, the transmit module
3 operable to modulate the information additive code onto a carrier signal, the carrier signal
4 modulated with ~~embedding~~ the information additive code comprising a coded transmission.

1 Claim 25. (original) The information additive code transmitter of claim 24,
2 wherein the carrier signal comprises a satellite uplink, cross-link, or down link signal.

1 Claim 26. (original) The information additive code transmitter of claim 24,
2 wherein the carrier signal comprises a terrestrial broadcast signal.

1 Claim 27. (currently amended) An information additive code receiver,
2 comprising:

3 a receive module configured to receive information additive code broadcast from
4 one or more information additive code transmitters, wherein the received information additive
5 code comprises a plurality of output symbols, wherein the information additive ~~codes~~ code
6 received from the one or more information additive code transmitters at any particular time is
7 independent of the information additive ~~codes~~ code previously received; and

8 a decoder coupled to the receive module and configured to decode the received
9 output symbols into source data, wherein when an amount of non-redundant information additive
10 code sufficient to reconstruct the source data has been received, the receiver module reconstructs
11 the source data independent of when, or from which of the information additive code
12 transmitters, the information additive code was received.

1 Claim 28. (previously presented) The information additive code receiver of
2 claim 27, wherein the decoder comprises a single stage decoder, further comprising:

3 a key regenerator coupled to the receive module, the key regenerator configured
4 to receive the output symbols, and to produce respective decoding keys in response;

5 a symbol decoder coupled to the receive module and to the key regenerator, the
6 key regenerator operable to receive the output symbols and the decoding keys, and in response
7 produce input symbols; and

8 an input file reassembler coupled to the symbol decoder and configured to receive
9 and reassemble the input symbols into source data.

1 Claim 29. (currently amended) The information additive code receiver of claim
2 27, wherein the decoder comprises a multistage decoder, further comprising:

3 a dynamic key regenerator coupled to the receive module, and configured to
4 receive the output symbols and to produce respective dynamic keys in response;

5 a symbol decoder, further comprising:

6 a) a dynamic decoder coupled to the dynamic key regenerator and the
7 received module, the dynamic decoder configured to receive the output symbols and the
8 dynamic keys, and to produce a first set of input symbols and redundant symbols in
9 response; and

10 b) a static decoder coupled to the dynamic decoder and configured to
11 receive the redundant symbols, the first set of input symbols, and static keys, the static
12 decoder, ~~in response~~, producing a second set of input symbols in response; and

13 c) an input file reassembler coupled to the symbol decoder and configured
14 to receive and reassemble the first and second set of input symbols into source data.

1 Claim 30. (original) The information additive code receiver of claim 27, wherein
2 each of the plurality of output symbols is associated with one or more input symbols, wherein an
3 output symbol associated with one symbol comprises an output symbol of degree, wherein an
4 output symbol associated with two or more source symbols comprises an output symbol of
5 degree two or more, and wherein at least one source symbol is marked as active, the information
6 additive code receiver, further comprising:

7 means for selecting one of the active source symbols that is associated
8 with an output symbol of degree two or higher; and

9 means for deactivating the selected source symbol that is associated with
10 the output symbol of degree two or higher.

1 Claim 31. (original) The information additive receiver of claim 30, further
2 comprising:

3 means for identifying at least one output symbol which is associated with only
4 one active source symbol;

5 means for recovering the active source symbol associated with the identified
6 output symbol; and

7 means for determining that no output symbol remains which is associated with
8 only one active source symbol.

1 Claim 32. (original) The information additive code receiver of claim 27, further
2 comprising a protocol converter having an input coupled to the receive module and an output
3 coupled to the decoder, the protocol converter configured to convert the received information
4 additive code from a first protocol to a second protocol.

1 Claim 33. (original) The information additive code receiver of claim 32, wherein
2 the first protocol is a satellite broadcasting system protocol and the second protocol is an IP
3 protocol.

1 Claim 34. (original) The information additive code receiver of claim 32, wherein
2 the first protocol is a terrestrial broadcasting system protocol and the second protocol is an IP
3 protocol.

1 Claim 35. (original) The information additive code receiver of claim 27, wherein
2 the received output symbols are modulated onto a carrier signal prior to transmission, the output
3 symbol modulated carrier signal comprising a coded transmission, the receive module further
4 comprising a demodulator operable to demodulate the coded transmission, thereby extracting the
5 output symbols, the receive module supplying the extracted output symbols to the decoder.

1 Claim 36. (original) The information additive code transmitter of claim 35,
2 wherein the carrier signal comprises a satellite uplink, cross-link, or down link signal.

1 Claim 37. (original) The information additive code transmitter of claim 35,
2 wherein the carrier signal comprises a terrestrial broadcast signal.

1 Claim 38. (currently amended) A method for communicating information
2 additive codes from one or more transmitters to one or more receivers, the method comprising:
3 encoding source data to information additive code, the information additive code
4 comprising a plurality of output symbols;

5 transmitting the information additive code to one or more information additive
6 code receivers from one or more sources;

7 receiving information additive code from the one or more sources, wherein the
8 information additive ~~codes~~ code received from the one or more sources at any particular time is
9 independent of the information additive ~~codes~~ code previously received, wherein when an

10 amount of non-redundant information additive code sufficient to reconstruct the source data has
11 been received, the information additive code receivers reconstruct the source data independent of
12 when, or in what order, the information additive code was received; and

13 decoding the information additive code substantially into a copy of the source
14 data.

1 Claim 39. (original) The method of claim 38, wherein encoding source data to
2 information additive codes comprises:

3 arranging the source data into an ordered sequence of input symbols; and

4 generating, from the ordered sequence of input symbols, a respective sequence of
5 output symbols, the respective sequence of output symbols comprising the information additive
6 code.

1 Claim 40. (previously presented) The method of claim 38, wherein decoding the
2 information additive codes comprises:

3 generating a plurality of decoding keys corresponding to the received plurality of
4 output symbols comprising the received information additive code; and
5 generating substantially, from the output symbols and the decoding keys, a copy
6 of the source data.

1 Claim 41. (original) The method of claim 38, wherein transmitting comprises
2 transmitting the information additive code via a satellite up link, cross-link, down link or by a
3 terrestrial link.

1 Claim 42. (previously presented) The method of claim 38, wherein receiving
2 comprises receiving the information additive codes via a satellite up link, cross-link, down link
3 or by a terrestrial link.

1 Claim 43. (original) The method of claim 38, further comprising converting,
2 prior to transmission, the protocol of the information additive code to a broadcast protocol.

1 Claim 44. (original) The method of claim 38, further comprising converting,
2 prior to decoding, the protocol of the received information additive code.

1 Claim 45. (currently amended) A method for broadcasting information additive
2 code, comprising:

3 encoding source data to a plurality of output symbols comprising information
4 additive code, wherein the information additive code transmitted any particular time is
5 independent of the information additive code previously transmitted; and

6 transmitting the information additive code to one or more information additive
7 code receivers, wherein when an amount of non-redundant information additive code sufficient
8 to reconstruct the source data has been received, the information additive code receivers

9 reconstruct the source data independent of when, or in what order, the information additive code
10 was received.

1 Claim 46. (original) The method of claim 45, wherein encoding source data
2 comprises:
3 arranging the source data into an ordered sequence of input symbols; and
4 generating, from the ordered sequence of input symbols, a respective sequence of
5 output symbols.

1 Claim 47. (previously amended) The method of claim 46, wherein generating a
2 respective sequence of output symbols comprises:
3 generating a sequence of encoding keys corresponding to the sequence of input
4 symbols; and
5 generating, from the respective sequences of the input symbols and the encoding
6 keys, the respective sequence of output symbols.

1 Claim 48. (previously amended) The method of claim 46, wherein generating a
2 respective sequence of output symbols comprises:
3 generating a sequence of static encoding keys corresponding to the sequence of
4 input symbols;
5 generating a sequence of dynamic encoding keys corresponding to the sequence
6 of input symbols;
7 generating, from respective sequences of the input symbols and the static
8 encoding keys, a respective sequence of redundant symbols; and
9 generating, from respective sequences of the input symbols, dynamic encoding
10 keys, and redundant symbols, a respective sequence of output symbols.

1 Claim 49. (currently amended) A method for receiving broadcast information
2 additive codes, comprising:
3 receiving information additive code broadcast from one or more of a plurality of
4 sources, the received information additive code comprising a plurality of output symbols,
5 wherein the information additive code received at any particular time is independent of the
6 information additive code previously received; and
7 wherein when an amount of non-redundant information additive code sufficient to
8 decode the source data has been received, decoding the plurality of output symbols into source
9 data, wherein the decoding is performed independent of when, or from which of the information
10 additive code sources, the information additive code was received.

1 Claim 50. (original) The method of claim 49, wherein the plurality of output
2 symbols comprises a sequence of output symbols, and wherein decoding the output symbols
3 comprises:
4 generating, from the sequence of output symbols, a respective sequence of
5 decoding keys;
6 generating from the sequence of output symbols and the respective sequence of
7 decoding keys, a respective sequence of input symbols; and
8 reassembling the respective sequence of input symbols into the source data.

1 Claim 51. (original) The method of claim 49, wherein the plurality of output
2 symbols comprises a sequence of output symbols, and wherein decoding the output symbols
3 comprises:
4 generating, from the sequence of output symbols, a respective sequence of
5 dynamic decoding keys;
6 generating a respective sequence of static decoding keys;
7 generating, from the respective sequences of output symbols, the dynamic
8 decoding keys, and the static encoding keys, a respective sequence of input symbols; and

reassembling the respective sequence of input symbols into the source data.

Claim 52. (not entered)

Claim 53. (currently amended) A method of generating a coded transmission comprising output symbols modulated onto a carrier signal and broadcast to a plurality of receivers, the ~~coded transmission produced through the processes of~~ method comprising:
encoding source data into output symbols; and
modulating the output symbols onto a carrier signal, the modulated carrier signal comprising the coded transmission, wherein the output symbols modulated onto the carrier signal at any particular time is are independent of the output symbols previously modulated onto the carrier signal, wherein when an amount of non-redundant output symbols sufficient to reconstruct the source data have been received, the receivers reconstruct the source data independent of when, or in what order, the output symbols were received.

Claim 54. (currently amended) The ~~coded transmission~~ method of claim 53, wherein the process of encoding the source data into output symbols comprises:
arranging the source data into an ordered sequence of input symbols; and
generating, from the ordered sequence of input symbols, a respective sequence of output symbols.

Claim 55. (currently amended) The ~~coded transmission~~ method of claim 54, wherein generating a respective sequence of output symbols comprises:
generating a sequence of encoding keys corresponding to the sequence of input symbols; and
generating, from the respective sequences of the input symbols and the encoding keys, the sequence of output symbols.

56. (currently amended) The ~~coded transmission~~ method of claim 54, wherein generating a respective sequence of output symbols comprises:

3 generating a sequence of static encoding keys corresponding to the sequence of
4 input symbols;

5 generating a sequence of dynamic encoding keys corresponding to the sequence
6 of input symbols;

7 generating, from respective sequences of the input symbols and the static
8 encoding keys, a respective sequence of redundant symbols; and

9 generating, from respective sequences of the input symbols, dynamic encoding
10 keys, and redundant symbols, the sequence of output symbols.

1 Claim 57. (currently amended) A computer program product, on a computer
2 readable storage medium, for broadcasting information additive codes, the computer program
3 product comprising:

4 instruction code to encode source data into output symbols comprising
5 information additive code; and

6 instruction code to transmit the information additive code to one or more
7 information additive code receivers, wherein the information additive code when transmitted to
8 the one or more information additive code receivers is independent of the information additive
9 code previously transmitted, wherein when an amount of non-redundant output symbols
10 sufficient to reconstruct the source data have been received, the information additive code
11 receivers reconstruct the source data independent of when, or in what order, the output symbols
12 were received.

1 Claim 58. (original) The computer program product of claim 57, wherein the
2 instruction code to encode the source data into output symbols comprises:

3 instruction code to arrange the source data into an ordered sequence of input
4 symbols; and

5 instruction code to generate a respective sequence of output symbols from the
6 ordered set of input symbols.

1 Claim 59. (previously presented) The computer program product of claim 58,
2 wherein the instruction code to generate a respective sequence of output symbols comprises:
3 instruction code to generate a sequence of encoding keys corresponding to the
4 sequence of input symbols; and
5 instruction code to generate, from the respective sequences of the input symbols
6 and the encoding keys, the sequence of output symbols.

1 Claim 60. (previously presented) The computer program product of claim 58,
2 wherein the instruction code to generate a respective sequence of output symbols comprises:
3 instruction code to generate a sequence of static encoding keys corresponding to
4 the sequence of input symbols;
5 instruction code to generate a sequence of dynamic encoding keys corresponding
6 to the sequence of input symbols;
7 instruction code to generate, from respective sequences of the input symbols and
8 the static encoding keys, a respective sequence of redundant symbols; and
9 instruction code to generate, from respective sequences of the input symbols,
10 dynamic encoding keys, and redundant symbols, the sequence of output symbols.

1 Claim 61. (currently amended) A computer program product, on a computer
2 readable storage medium, for receiving broadcast information additive codes, the computer
3 program product comprising:
4 instruction code to receive a plurality of output symbols comprising the
5 information additive code, the information additive code broadcast from one or more sources;
6 and
7 instruction code to decode the received output symbols into source data, wherein
8 the information additive code, when received, is independent of information additive code
9 previously received, wherein when an amount of non-redundant output symbols sufficient to
10 decode the source data have been received, the instruction code to decode the received output

11 symbols decodes the output symbols independent of when, or in what order, the output symbols
12 were received.

1 Claim 62. (original) The computer program product of claim 61, wherein the
2 received output symbols comprise a sequence of output symbols, and wherein the instruction
3 code to decode the output symbols comprises:
4 instruction code to generate, from the sequence of received output symbols, a
5 respective sequence of decoding keys;
6 instruction code to generate from the sequence of received output symbols and the
7 respective sequence of decoding keys, a respective sequence of input symbols; and
8 instruction code to reassemble the sequence of input symbols into the source data.

1 Claim 63. (original) The computer program product of claim 61, wherein the
2 received output symbols comprise a sequence of output symbols, and wherein the instruction
3 code to decode the output symbols comprises:
4 instruction code to generate, from the sequence of received output symbols, a
5 respective sequence of dynamic decoding keys;
6 instruction code to generate a respective sequence of static decoding keys;
7 instruction code to generate, from the respective sequences of received output
8 symbols, the dynamic decoding keys, and the static encoding keys, a respective sequence of
9 input symbols; and
10 instruction code to reassemble the sequence of input symbols into the source data.